without mingling, one ray seemed to cut another off abruptly, only one ray ever appearing to pass the point of meeting. About nine o'clock, rays could be faintly seen in the south extending up to the point of meeting. Then these rays grew brighter, extending from about 30° above the *southern* horizon, and *throbbing* up from there to the place near the zenith where the northern, eastern, and western rays met. The southern rays were fainter than the others. They may have extended further towards the horizon than 30° above it, but, if they did, the lower part of them was too faint to be seen, on account of the city lights. I have never before seen or heard of an aurora in this latitude, with rays coming upwards from the south. The whole display seems to have been much farther south than usual. It was also much brighter than is usually seen here, even on exceptional occasions.

Finally, a mass of cloud about 12° long and 5° to 7° wide, formed in the north and drifted very slowly away to the eastward. During the aurora the *relative* humidity seemed to increase, and it grew quite misty. This I have noticed during every exceptionally brilliant auroral display that I have seen. The mass of cloud mentioned above was about 40° above the horizon. No other cloud formed as high as this, though a few very small ones appeared in the north-west to north-east, from 20° to 30° above the horizon. F. R. WELSH.

Philadelphia, U.S.A., April 2.

Fireball.

ON Wednesday, April 11, a somewhat sudden and heavy thunderstorm passed over the Dunstable and Luton district. The lightning, which was close overhead, killed several cows, and did other damage. The storm was ushered in by banks of lurid coppery and dark grey clouds from the south-west. When the storm was at its heaviest, bright blue sky could be seen towards the north-east.

Whilst watching the incessant forked lightning in the east at 2.30 p.m., I suddenly saw a broad spout of fire drop almost vertically from the clouds to the earth. The band of fire was not at all like lightning, as it was ten or twenty times as broad, and formed a continuous, slightly curved line, without the slightest trace of zig-zag. It was like a large ball of ribbon being quickly unrolled, one end being retained in the clouds. The fall was less rapid than lightning, and was accompanied by a dazzling light. It was immediately preceded and followed by the crash of thunder, but the thunder was at the time continuous.

The fall appeared to be close by, and I soon after learned that a "fireball" had descended on the Dunstable side of Luton, near Dallow Farm, about four miles from here. On visiting the spot, and questioning two or three eye-witnesses of the fall, I was told that the "thunderbolt" was seen as a large "ball of fire," that the fall was accompanied by a loud rushing sound and a dazzling intense light.

The fire descended close to a well, and on to the roof of a small wooden barn or shed packed with firewood, garden tools, and potatoes. The roof was of red pantiles, and the contact of the fire instantly smashed every tile to atoms, and broke up and suddenly lighted the barn, so that every part, with the contents, was totally destroyed. The men on the spot said the sound of the impact on the tiles was so loud that they thought all the cottages near by had had their roofs smashed in. Other barns and sheds near by were visibly shaken.

Immediately before the descent a workman was inside the barn taking shelter from the storm, but being frightened at the unusual violence of the tempest, he put a sack over his shoulders and walked into the open; as soon as he had done so, the ball of fire fell on to the shed or barn, with the result described.

Dunstable, April 15. WORTHINGTON G. SMITH.

Micro-Organisms and Fermentation.

IN your issue dated April 5, in a review of Jörgensen's "Micro-Organisms and Fermentation," occurs the following:—"In England, however, we are slow in applying scientific research to industrial pursuits, and though a number of brewers already use Hansen's system, it can hardly be said that it has received the attention it deserves, and chance, tradition, and blind empiricism still govern too much the manufacture of beer in England."

Strange to say, on the same evening a large number of brewers and scientific workers were gathered together at the Hôtel Métropole to do honour to an English brewer, who has also made his name known widely in the scientific world—Mr. Horace T. Brown, F.R.S., &c., and the following quotations from a report of the meeting, which I herewith enclose, appear somewhat opposed to the statement above quoted:—

"It is the boast of Englishmen that although behind some other nations in the application of science to many branches of manufacture, in regard to that of malt and beer they rank second to none." Again, to quote Mr. Brown:—"The two really great foundation stones of modern scientific brewing undoubtedly are the vitalistic views of fermentation initiated by Pasteur and the important discoveries of our distinguished countryman, Cornelius O'Sullivan—discoveries which first enabled us to explain the complex chemical changes of the mashing process."

If such firms as Messrs. Bass and Co., Allsopp and Sons, and Wm. Younger and Co., with their regular staff of scientifically trained brewers and skilled analysts, can be accused of "blind empiricism," even though they do not use Hansen's system, the term must have a new meaning.

Speaking from a knowledge of breweries in various parts of the kingdom, one can affirm that there is almost a general desire to hear the latest scientific suggestions for practical brewing, and a marked willingness to adopt methods that can be shown to be practically advantageous; and Mr Kanthack must, I think, be labouring under a total misapprehension of the English brewers' attitude with regard to the science of brewing.

On the other hand, the natural caution of English and Scotch manufacturers, which has largely assisted in making our country the commercial head of the world, prevents them adopting the innumerable scientific suggestions which have not as yet been demonstrated to be practical improvements as regards the English process of brewing. FRANK E. LOTT.

Burton-upon-Trent.

The North-East Wind.—Devonian Schists.

ABSENCES from London and pressure of work in the intervals have thrown me back in reading NATURE; hence my delay in replying to Mr. Burbury's criticism.

I have not made a special study of meteorology, and have had to follow authorities, such as Scott, Abercrombie, and Hann, but I believe my statements about the coldness of our spring east winds accord generally with what they say. There is a tendency, according to the first, for the air to flow from land to sea in winter time, and from sea to land in summer; and an anticyclone, according to the last, usually extends in the winter over north-eastern Europe and the adjacent region of Asia, and a cyclonic area over the northern Atlantic. The latter appears, to move somewhat northward about or after the vernal equinox, and to cause a more steady draught westward from the other area. It must be remembered that the maximum of cold lags after midwinter, and that the exceptional conditions of our island—such as the frequent winter "bombardment" by smaller and deeper cyclones, interferes with the regular development of a winter east wind, such as my friend suggests. Still, I speak with all submission, remembering the saying *ne sutor ultra.*

It may save time to add that I have observed how a remark of mine has again stirred up Mr. A. R. Hunt in defence of Devonian schists. In regard to his letter, I content myself with repeating what I have already said: viz., that either I have wasted a good many years in study bearing on this question, both in the field and with the microscope, or his "evidence" is of little value, and his knives of the wrong temper for the dissection which he has essayed. He will not succeed in drawing me into a controversy with him on this question. Life is short.

T. G. BONNEY.

Are Birds on the Wing Killed by Lightning?

A LADY was looking out of the window when a flash of lightning occurred, accompanied simultaneously by a clap of thunder without reverberation. Immediately afterwards she

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observed a dead gull, lying in a grass field in front of the window, which, she is convinced, was not there before.

Those who picked the bird up report it as still warm, and it is said that it smelt villanously of "brimstone." I should like to know whether a bird *not perched* can be killed by lightning, and, if so, whether instances are common. Skelfo.

The Early Return of Birds.

The remarkably early appearance of some of our migratory birds this season is worthy of note. On Wednesday, April 4, while crossing some fields south of Ashtead Station, a solitary chimney swallow (*Hirundo rustica*) passed close to me, flying near to the ground.

On the following Saturday (7th inst.), when strolling through the woods on the Common, I heard two cuckoos, getting quite near them to prevent mistake. They have been heard in the neighbourhood each day since. Robert M. Prideaux.

Ashtead, Surrey.

The Foundations of Dynamics.

If no one else cares to raise the question, may I ask Mr. Bassett how he fixes the foundations of his dynamics, viz., the axes of reference to which the positions and velocities of his particles are referred? There are other questions, of more or less metaphysical interest (such as the nature of "Force"), which his paper does not touch; but this one is of importance to the most practical view of the subject; and only an elementary text-book for schoolboys can afford to beg it, while treating of the Foundations of Dynamics. Edward T. Dixon.

Cambridge, April 13.

THE ELEVENTH INTERNATIONAL MEDICAL CONGRESS.

Last autumn, when the public health of Europe was in an unsatisfactory condition, it was thought that it would be wise to postpone the Medical Congress until this spring, though it was feared by everyone that such a determination would be fatal to the efforts of the Congress. The votes of the majority and of the most influential members of the Executive Committee, however, impressed upon Prof. Baccelli the necessity of postponement. It was also thought that the visitors would prefer to enjoy the attractions of the city in the spring rather than in the autumn. No one in Rome expected such a numerous concourse of savants, doctors, and others, as assembled on this occasion. At such an extraordinary meeting we must not only consider the characteristic note of the congress and the certainty of its success, but also ascertain the causes of various inconveniences which members of the congress have had to submit to, and of which complaint has been made.

The object of a congress is to afford an opportunity to its members to make new personal acquaintances and to renew old ones with the view of exchanging ideas between men who live at great distances from each other, and to ventilate their arguments.

A congress provides also a means of estimating the scientific condition of a country, which it is impossible to do through correspondence or through the public press.

The ordinary channel of particularity was abandoned at the Congress, and it will have been seen from the speeches that more general and comprehensive ideas were evolved than is possible through ordinary scientific literature.

Considered in this sense, the Congress at Rome has been a great success, and it has been easy to see that visitors have a growing sense of admiration for medical science in Italy, and especially for the younger branches of the profession. Italy, however, has been regarded from other points of view. Its reputation led many persons to expect a spectacle of misery, but they, on the contrary, have been agreeably surprised at the enlightened aspect, comforts, and welfare of the land. This has shown visitors that they had formed a wrong impression, and the critical condition has proved only a temporary difficulty; for the original foundation still exists unchanged.

The best proofs of scientific progress were seen while travelling through the Mont Cenis Tunnel and visiting Turin. Passengers found there many large edifices destined shortly to be utilised as scientific institutions.

Only one of the four blockss is entirely finished and one almost furnished. On one side is the Department of General Pathology (Prof. Bizzozero), and that of Experimental Pharmacy in Medicine (Prof. Giacosa). On the other side, Physiology (Prof. Mosso).

Prof. Mosso has distributed to his colleagues of the section of physiology a pamphlet containing the description and drawings of his institute. Everyone has admired the beauty of the new laboratory. The University of Turin is the second in rank in Italy for the number of students it will accommodate.

The Congress was divided into several sections. The conferences were held in the central part of Rome, in a building very badly selected, but which had the advantage of being near the building where the International Exhibition was held. The meetings of the sections were held in the Policlinic buildings, outside of the Porta Pia, at a convenient distance from the centre of the town, but in a quarter very difficult of access.

The Policlinic is a very large institute, built by Prof. Baccelli. It is not yet finished, a small portion only being complete. The essential and historical elements of the eternal city are equally represented in this institute, which has evidently been built regardless of cost in its external appearance and its maintenance hereafter. The Policlinic was built for the accommodation of the clinics. It is arranged not only for the welfare of the sick, but also in the interests of students.

It is interesting to note that the man who has built two edifices for the clinics in the Policlinic has totally overlooked the tuition. The complete buildings are five in number, connected by a passage which in the future will be turned into a portico.

The central building, which is also the largest, has a large marble staircase, which called forth the admiration of more than one of the congressists; it contained the offices of the presidency, secretary, and accommodation for the press, post, and strangers' committee.

The meetings were held from the 30th March to the 5th of April, from 9 a.m. until 3 p.m. At 4 in the afternoon addresses were given, which constituted a most interesting part of the programme. Among these addresses we must mention those of Prof. Virchow, of Bizzozero, growth and regeneration in the organism; Cajal, morphology of nervous cells; Danilewsky, protoplasm and its modifications by life; Foster, the organisation of science. Other addresses were given by Profs. Brouardel, Babes, Nothnagel, Laache, Kocher, Jacoby, and Stockvis.

In some sections the debates were carried on with difficulty. The most rational method has not been always observed, many meetings therefore have left a certain impression of confusion. Certainly for a future congress it will be necessary to make some definite rule on the matter; that is to say, to indicate the special theme and argument, which will conduct the discussion in a more useful manner between competent men, who are always to be found in such a congress. It is a cause of complaint that in such an assembly those who wished

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